

Concise report

Current state of musculoskeletal ultrasound training and implementation in Europe: results of a survey of experts and scientific societies

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Abstract

Objective. To document the current state of musculoskeletal US (MSUS) training and extent of implementation among rheumatologists in the member countries of EULAR.

Methods. An English-language questionnaire, divided into five sections (demographics, clinical use of MSUS, overall MSUS training for rheumatologists, MSUS education in the rheumatology training curriculum and education in MSUS offered by the national rheumatology society) was sent by e-mail to three different groups: (i) all national rheumatology societies of EULAR; (ii) all national societies of the European Federation of Societies for Ultrasound in Medicine and Biology; and (iii) 19 senior rheumatologists involved in MSUS training from 14 European countries.

Results. Thirty-one (70.5%) out of 44 countries responded to the questionnaire (59.1% of national rheumatology societies, 34.5% of the national US societies and 100% of expert ultrasonographers). Rheumatology was listed among medical specialities that mainly perform MSUS in 20 (64.5%) countries; however, in most [19 (63.3%)] countries <10% of rheumatologists routinely perform MSUS in clinical practice. Training varies widely from country to country, with low rates of competency assessment. MSUS education is part of the rheumatology training curriculum in over half the surveyed countries, being compulsory in 7 (22.6%) countries and optional in 11 (35.5%).

Conclusions. This study confirms the high uptake of MSUS across Europe. The reported variation in training and practice between countries suggests a need for standardization in areas including training guidelines.

Key words: Musculoskeletal ultrasound, Education, Training, Europe.

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Introduction

Over the past decade, musculoskeletal US (MSUS) has become an important tool in clinical practice in rheumatology, and has demonstrated its value across a range of rheumatic conditions. Appropriate training is highly important to ensure skilled and safe use of MSUS by rheumatologists. Recently, a number of relevant papers on MSUS education, curriculum and competency for rheumatologists have been published [1–7]. Experts in MSUS collaborate both under the umbrella of the EULAR and the OMERACT group to standardize scanning methods, define abnormalities, determine reliability and promote education [8–18].

The use of MSUS has developed very differently across Europe. There are limited data on the present impact of MSUS in rheumatology across individual European countries. The purpose of this study was to establish the current state of MSUS training and the extent of implementation among rheumatologists in those countries whose national rheumatology societies are members of EULAR.

Methods

Study design

An English-language survey was designed by a group of senior ultrasonographer rheumatologists. The questionnaire was sent by e-mail to three different groups in mid-2009:

- (i) all 44 national rheumatology societies of EULAR (incorporating 41 European countries, Armenia, Israel and Lebanon);
- (ii) all 29 national societies of the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB; 28 European countries and Israel; all included in the 44 EULAR countries); and
- (iii) nineteen rheumatologists expert in MSUS (including the experts who designed the questionnaire) from 14 European countries whose involvement in training programmes in their countries was known by the authors.

An explanation of the purpose of the survey accompanied the questionnaire. After 8 and 12 weeks, e-mail reminders were sent to the non-responders.

Questionnaire design and content

Questionnaire for the EULAR rheumatology societies and expert ultrasonographers

The questionnaire was divided into five sections: demographics, performance of MSUS, overall MSUS training for rheumatologists, MSUS education in the rheumatology training curriculum and education in MSUS offered by the national rheumatology society.

Questionnaire for the EFSUMB societies

The questionnaire for the EFSUMB societies was again divided into five sections exploring mostly the same

areas: demographics, performance of MSUS, MSUS training for non-radiologists, MSUS education in the training curriculum of medical specialists and education in MSUS offered by the national US society.

Analysis

Simple descriptive and summary statistics were calculated from the responses. When there were contradictory answers between the questionnaires from MSUS experts and the national rheumatology society for a given country, the respondents were asked to review their differences and to provide a consensus response.

Results

In all, we obtained information from 31 (70.5%) out of 44 countries (supplementary table 1, available as supplementary data at *Rheumatology* Online). The response rate was 59.1% (26 out of 44) from the national rheumatology societies, 34.5% (10 out of 29) from the national US societies and 100% (19 out of 19) from the ultrasonographer rheumatologists. We obtained information on 30 countries from the ultrasonographer rheumatologists and/or the national rheumatology societies. We additionally obtained answers from the national US societies of nine of these countries. There were some minor contradictory responses between the rheumatologist expert in MSUS and the national rheumatology society from four countries, which were resolved after feedback.

Demographics

The reported number of rheumatologists in the EULAR countries ranged from 6 (Malta) to 2400 (France). The national US societies reported from 9 (Norway) to 7200 (Germany) members.

Clinical use of MSUS

Rheumatology was listed among medical specialities that predominantly perform MSUS in 20 (64.5%) countries. Additionally, rheumatologists also performed MSUS in further seven (22.6%) countries, where radiologists mainly perform MSUS (supplementary table 2, available as supplementary data at *Rheumatology* Online).

MSUS was routinely performed by <10% of rheumatologists in 19 (63.3%) countries. In eight (26.7%) countries, 10–50% of rheumatologists routinely perform MSUS. Reportedly, in only three (10%) of all respondent countries did >50% of rheumatologists routinely perform MSUS (supplementary figure 1, available as supplementary data at *Rheumatology* Online).

With regard to the percentage of rheumatology departments/units that routinely perform MSUS, the survey showed the following: <10% in 11 (36.7%) countries; 10–50% in 13 (43.3%) countries; 50–80% in 2 (6.7%) countries; and >80%, in 4 (13.3%) countries (supplementary figure 1, available as supplementary data at *Rheumatology* Online).

Rheumatologists got reimbursement for MSUS in 18 (60%) countries. Reimbursement came from private practice in most [11] countries, from public practice in three and from both private and public practice in four countries.

MSUS training for rheumatologists

All countries described various forms of training including courses, mentorship, formal or informal training from radiologists and rheumatologists, training during fellowship in rheumatology and self-teaching.

In 14 (46.7%) countries (Armenia, Bosnia and Herzegovina, Croatia, France, Hungary, Iceland, Ireland, Israel, Italy, Lebanon, Malta, Moldova, Poland and Portugal), <10% of rheumatologists had reportedly been trained in MSUS. In 11 (36.7%) countries (Austria, Denmark, The Netherlands, Norway, Romania, Russian Federation, Serbia, Slovenia, Switzerland, Turkey and the UK), 10–50% of rheumatologists had received training in MSUS. Only in five (16.7%) countries (Bulgaria, Finland, Germany, Slovakia and Spain) had >50% rheumatologists been trained in MSUS, with Germany reporting >80% (Fig. 1).

In 16 (51.6%) countries (Austria, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Macedonia, Norway, Poland, Serbia, Slovakia, Spain, Switzerland and the UK), a training programme in MSUS for rheumatologists was reported. These programmes consisted of courses organized by the national rheumatology, US and/or radiology societies or universities, as well as a training period ranging from 3 to 36 months in rheumatology and/or radiology departments or with experts in MSUS.

MSUS education in the rheumatology training curriculum

Again, the inclusion of MSUS education in the rheumatology training curriculum varied among countries. It was obligatory in 7 (22.6%) countries (Bulgaria, Germany, Italy, Norway, Romania, Serbia and Slovakia) and optional or recommended in a further 11 (35.5%) countries (Austria, Croatia, Denmark, Finland, Ireland, The Netherlands, Russian Federation, Slovenia, Spain, Switzerland and the UK). MSUS training was not included in the rheumatology curriculum in the remaining 13 (42%) countries.

MSUS competency in rheumatology curriculum was assessed only in six (19.4%) countries. The competency assessment consisted of practical/theoretical examinations in Germany, Italy and the Russian Federation and/or a number of supervised MSUS examinations that ranged from 300 to 400 in Germany, Slovakia, Slovenia and Switzerland. In Denmark, Norway, Slovakia, Slovenia and Switzerland, rheumatology trainees must attend MSUS courses.

Education in MSUS offered by the national rheumatology societies

The national rheumatology societies offered courses on MSUS to rheumatologists in 12 (40%) of the respondent countries (Fig. 2). Some courses had only started recently

(Hungary), whereas others had been running for 12 years (Spain). Ireland and Poland introduced MSUS courses under the umbrella of the national rheumatology society in 2009. In most countries, these courses consisted of one-level training, whereas in other countries there were two training levels (basic and advanced courses) or three training levels (basic, intermediate and advanced courses). The number of courses per year, duration, percentage of time spent on hands-on scanning and theoretical education and number of participants per tutor on practical sessions widely differed from country to country (supplementary table 3, available as supplementary data at *Rheumatology* Online).

Competency in MSUS at the end of the rheumatology society courses was assessed in six (20%) countries (Fig. 2). It consisted of practical/theoretical examinations in all countries with additional supervised MSUS examinations after the courses that ranged from 200 to 500 in most of them.

Education in MSUS offered by the national US societies

The national US societies from seven (70%) countries (Austria, Denmark, Germany, Macedonia, Norway, Spain and Switzerland) have organized courses on MSUS for times varying from 1 to >25 years. Radiologists, rheumatologists, orthopaedic surgeons, sport medicine specialists, physical medicine specialists, internal medicine specialists, general practitioners and paediatricians are the main attendees at these courses.

These courses consisted of three training levels, two training levels or one training level (supplementary table 3, available as supplementary data at *Rheumatology* Online). In only four countries (Germany, Macedonia, Spain and Switzerland), was MSUS competency assessed by theoretical and practical examinations and, additionally, a number of supervised MSUS examinations after the courses.

Fig. 1 Percentage of rheumatologists who have received training in MSUS by number of countries.

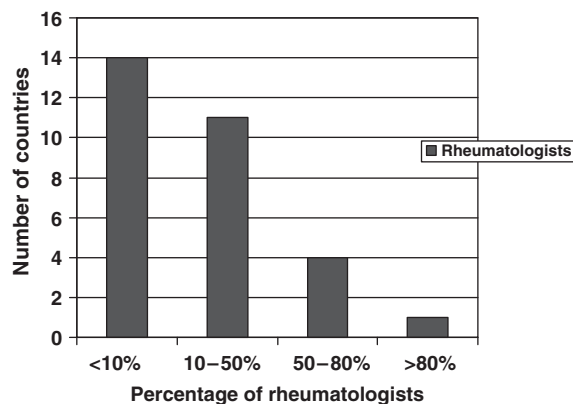
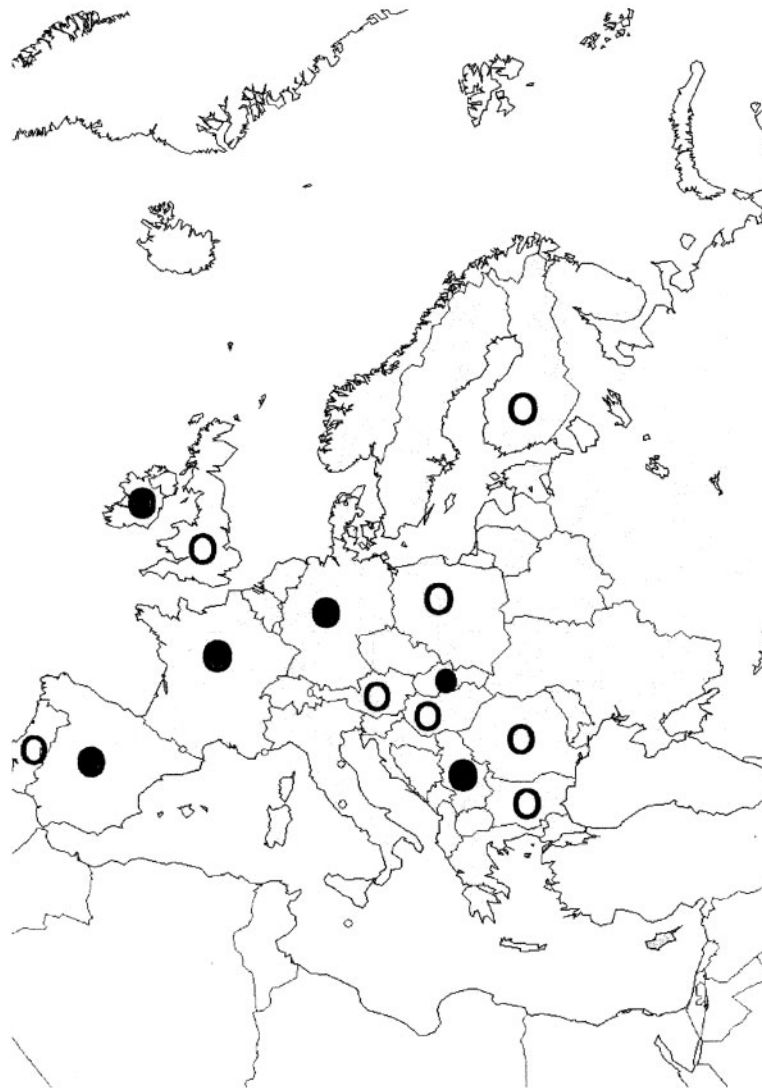


Fig. 2 Map with marked countries (○) where the national rheumatology society offers training in MSUS and (●) competency in MSUS is assessed after this training.



Discussion

This survey presents the first extensive picture of the use of MSUS in rheumatology across Europe in 2009, and highlights a number of interesting points with regard to practice and training. In 1999, a preliminary survey was conducted at the XIV EULAR meeting in Glasgow. One hundred and eighty questionnaires were randomly distributed to rheumatologists attending imaging-related sessions, and 92 rheumatologists from 19 European countries returned the questionnaire. Among them, only 40% had performed MSUS in their own department, but only few had received structured training [1]. In 2004, another European survey presented at the XIX EULAR Congress in Berlin (published in abstract form [19]) showed that in only 3 (14%) of the 21 respondent countries MSUS was mainly performed by rheumatologists. The current survey was different from these previous surveys mainly because it

covered more areas on MSUS practice and training and was responded by more European countries. In addition, this study was potentially less biased than the Glasgow survey [1] by the fact that it was sent to all EULAR countries (even though they did not all respond) instead of being given at imaging-related meetings.

Since 1999, we have seen a notable increase in the number of countries in which MSUS is routinely performed by rheumatologists, and consequently a rapidly increasing need for training, reflected in the wide variety of training courses currently on offer. It is also interesting to see the evolving perspective of national rheumatology societies on the development and implementation of MSUS as reflected by the high percentage of training courses directly organized by them.

While there is an increasing evidence for considering MSUS, an effective tool in clinical and research practice (i.e. the stethoscope of rheumatologist), the percentage

of rheumatologists routinely performing MSUS in each country is still <50% in most countries surveyed.

At the moment, there are still not enough rheumatologists and/or rheumatology centres able to provide MSUS training in Europe. In a recent survey of rheumatologists by the British Society for Rheumatology, the principal reason given for not performing MSUS was the lack of training (75% of the respondents) [20]. Currently, many European rheumatologists still have a large component of self-training in their MSUS education.

It is now clear that the rising number of rheumatologists performing MSUS has important educational implications, particularly with regard to initial and ongoing training. Who should deliver training (rheumatologist or radiologist, MSUS experts in a formal group), when it should be delivered (during rheumatology fellowship training or after specialization) and in which form (attendance at courses with experts, a web-based approach; with or without the accreditation of national societies), are still areas for discussion. In 2007, a group of European rheumatologists who comprised the faculty of the XIV EULAR US course in Spain, developed educational guidelines for the content and conduct of EULAR US courses [18]; these are recommended for national and local MSUS training programmes. They might also be useful for standardizing rheumatology MSUS training in Europe. Importantly, the high variability in the content of training and the almost complete absence of evaluation of competencies reported in the current survey highlights the need for a unified approach to training and competency assessment.

Some limitations of this survey should be noted. Although overall response was good, we did not obtain information from the national rheumatology or US societies of a number of European countries, which introduces bias in the results. The fact that only one single representative of many of the respondent country answered the survey could have also biased the results. In addition, a high degree of interest, or requirement for training among respondents could have led to overestimates of MSUS use and education.

In conclusion, this survey demonstrates the current state of MSUS usage in EULAR member countries and a huge growth in uptake when compared with previous surveys, especially in the number of countries that actually perform MSUS. A number of challenges in terms of lack of training facilities, non-standardized training content and a relative lack of national registries and competency assessment are evident.

Rheumatology key message

- There is high demand for MSUS education across Europe.

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Supplementary data

Supplementary data are available at *Rheumatology* Online.

References

- 1 Wakefield RJ, Goh E, Conaghan PG, Karim Z, Emery P. Musculoskeletal ultrasonography in Europe: results of a rheumatologist-based survey at a EULAR meeting. *Rheumatology* 2003;42:1251–3.
- 2 Brown AK, O'Connor PJ, Wakefield RJ, Roberts TE, Karim Z, Emery P. Recommendations for musculoskeletal ultrasonography by rheumatologists: setting global standards for best practice by expert consensus. *Arthritis Rheum* 2005;53:83–92.
- 3 Taggart A, Filippucci E, Wright G *et al.* Musculoskeletal ultrasound training in rheumatology: the Belfast experience. *Rheumatology* 2006;45:102–5.
- 4 Brown AK, O'Connor PJ, Wakefield RJ, Roberts TE, Karim Z, Emery P. Practice, training, and ultrasonography for rheumatologists: the development of specific competency based educational outcomes. *Ann Rheum Dis* 2006; 65:629–36.
- 5 Filippucci E, Meenagh G, Ciapetti A, Iagnocco A, Taggart A, Grassi W. E-learning in ultrasonography: a web based approach. *Ann Rheum Dis* 2007;66:962–5.
- 6 Wright SA, Bell AL. Enhancement of undergraduate rheumatology teaching through the use of musculoskeletal ultrasound. *Rheumatology* 2008;47:1564–6.
- 7 Backhaus M, Burmester GR, Gerber T *et al.* Working Group for Musculoskeletal Ultrasound in the EULAR Standing Committee on International Clinical Studies including Therapeutic Trials. Guidelines for musculoskeletal ultrasound in rheumatology. *Ann Rheum Dis* 2001;60:641–9.
- 8 Wakefield RJ, Balint PV, Szkudlarek M *et al.* Musculoskeletal ultrasound including definitions for ultrasonographic pathology. *J Rheumatol* 2005;32:2485–7.
- 9 Joshua F, Lassere M, Bruyn GA *et al.* Summary findings of a systematic review of the ultrasound assessment of synovitis. *J Rheumatol* 2007;34:839–47.
- 10 Wakefield RJ, D'Agostino MA, Iagnocco A *et al.* The OMERACT Ultrasound Group: status of current activities and research directions. *J Rheumatol* 2007;34:848–51.
- 11 Scheel AK, Schmidt WA, Hermann KG *et al.* Interobserver reliability of rheumatologists performing musculoskeletal ultrasonography: results from a EULAR "Train the Trainers" course. *Ann Rheum Dis* 2005;64:1043–9.
- 12 Naredo E, Möller I, Moragues C *et al.* Inter-observer reliability in musculoskeletal ultrasonography: results from a "Teach-the-Teachers" rheumatologist course. *Ann Rheum Dis* 2006;65:14–9.
- 13 Koski JM, Saarakkala S, Helle M *et al.* Assessing the intra- and inter-reader reliability of dynamic ultrasound images in power Doppler ultrasonography. *Ann Rheum Dis* 2006;65:1658–60.
- 14 Bruyn GA, Naredo E, Möller I *et al.* Reliability of ultrasonography in detecting shoulder disease in patients with rheumatoid arthritis. *Ann Rheum Dis* 2009; 68:357–61.

- 15 Scheel AK, Matteson EL, Dasgupta B *et al.* Reliability exercise for the polymyalgia rheumatica classification criteria study: the Oranjewoud ultrasound substudy. *Int J Rheumatol* 2009;2009:738931.
- 16 D'Agostino MA, Aegerter P, Jousse-Joulin S *et al.* How to evaluate and improve the reliability of power Doppler ultrasonography for assessing enthesitis in spondylarthritis. *Arthritis Rheum* 2009;61:61–9.
- 17 D'Agostino MA, Conaghan PG, Naredo E *et al.* The OMERACT ultrasound task force. *Advances and priorities. J Rheumatol* 2009;36:1829–32.
- 18 Naredo E, Bijlsma JW, Conaghan PG *et al.* Recommendations for the content and conduct of European League Against Rheumatism (EULAR) musculoskeletal ultrasound courses. *Ann Rheum Dis* 2008;67:1017–22.
- 19 Schmidt WA. Education and training in sonography. *Ann Rheum Dis* 2004;63(Suppl.):S10.
- 20 Cunningham J, Platt P, Raftery G, Kana D. Attitudes of United Kingdom rheumatologists to musculoskeletal ultrasound practice and training. *Ann Rheum Dis* 2007;66:1381–3.